

GOA trial site report

Wheat - understanding the risk associated with growing varieties with varying susceptibility to foliar diseases.

Grain Orana Alliance

Trial code:	GADI02023-1
Season/year:	Winter 2023
Location:	Wellington
Trial partners:	Joe Mason
Trial establishment date:	45061

Keywords

GADI020, disease, NVT, risk, stripe rust, fungicides, yield response.

Take home messages

- There were no differences in yield between the sprayed and unsprayed treatment of each variety, in a low disease pressure year.
- Fungicide applications made no difference to grain quality compared with unsprayed treatments in a low disease pressure year.
- The use of fungicides in dry, low disease pressure years may not be profitable.

Background

2022 was a prolific year for fungal disease in Central West NSW, with stripe rust prevalent in many wheat crops. Grain Orana Alliance (GOA) planted 5 sentinel wheat sites to a range of varieties with the aim of early pathogen identification. Stripe rust in 2022 developed earlier than normal in the growing season, before expression of the adult plant resistance (APR) genes, which made early pathogen identification difficult (using sentinels). However, as the crop matured it was evident that some varieties were far more resistant than others and pathotype identification using the sentinels was possible. Yields were taken from these trials and varieties with lower resistance ratings, in some cases, yielded less than half of those which had the most resistance.

GOA trial site report

Generally, varieties with lower resistance ratings perform well in National Variety Trials (NVT)¹, typically out yielding the standard varieties (i.e. Vixen^d averaged 105 and 108% of EGA Gregory^d in the NVT North East and West respectively), however in the 2022 sentinel trials the varieties with lower resistance rating had a very high yield penalty. The sentinel work indicates that the yield penalty for growing susceptible varieties might be far greater than the yield benefit as shown in the NVT trials, as these are managed/treated liberally for fungal disease while the GOA sentinel work had no fungicides applied.

While it is important to understand what level of yield is protected by fungicides use, it is also critical to understand what level of risk has been taken on by growers in relying on fungicides to protect yields. In 2022 there were many cases where growers were unable to spray as paddocks were too wet. It also starts to illustrate the risk to growers if resistance develops and fungicides are not as effective. This knowledge may help shift growers to more resistant varieties sooner.

This trial looks to quantify the yield losses caused by foliar diseases (mainly stripe rust, septoria, and yellow leaf spot) of common varieties grown in the Orana Region by employing a full fungicide strategy compared with unsprayed treatments.

Aims

- To quantify the yield penalty of a range of common wheat varieties with differing resistance ratings in the presence of fungal diseases.

Treatment descriptions (see Table 1.)

Twelve varieties commonly grown in the Orana Region with a range of disease resistance ratings were selected and were either treated with a full fungicide program or left unsprayed (untreated). The varieties and their ratings are listed in Table 1, while the fungicides applied are outlined in Table 2.

Table 1: Varieties and their disease ratings.

Variety	2023 East Coast rating	239 rating	198 rating
Beckom	MRMS	MR	MR
Catapult	S	S	MRMS
Condo	MS	MRMS	MRMS
Coolah	MSS	-	-
Longsword	R/S	RMR	RMR
LRPB Hellfire	MRMS	-	-

¹ NVT (National Variety Trial)

GOA trial site report

LRPB Lancer	RMR	RMR	RMR
LRPB Raider	MR	RMR	RMR
LRPB Reliant	MR	-	-
LRPB Trojan	S	-	SVS
Scepter	MSS	MRMS	MR
Vixen	SVS	-	-

Table 2: Fungicide applications list.

Date	Chemical	Active(s)	Rate (ml/ha)	Wetter	Rate (%)	Application
15/05/2023	Impact®	250 g/L flutriafol	400	N/A	N/A	On fertiliser at sowing
24/07/2023	Propiconazole 250EC	250g/L propiconazole	285	N/A	N/A	Ground rig
16/08/2023	Presaro® 420SC	210 g/L prothioconazole, 210 g/L tebuconazole	300	BS1000	0.25%	Ground rig
06/09/2023	Tazer Xpert	80 g/L azoxystrobin, 31.25 g/L epoxiconasol	2,000	Hasten	0.50%	Ground rig

Site selection: The site is a higher rainfall area, with reports of disease outbreaks in 2022.

Rainfall: 2023 was a relatively dry season, however there was considerable soil moisture left over from 2022. Rainfall details are in Table 3.

Table 3: Monthly rainfall² (mm) and long-term average (LTA).

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2022	128	17	114	151	66	14	85	126	99	183	91	22	1096
2023	75	33	31	43	7	42	33	22	6	40	97	50	479
LTA	67	54	53	43	43	49	48	47	45	58	61	58	626

² Gridded data for the trial site from: Access Gridded Data | LongPaddock | Queensland Government

GOA trial site report

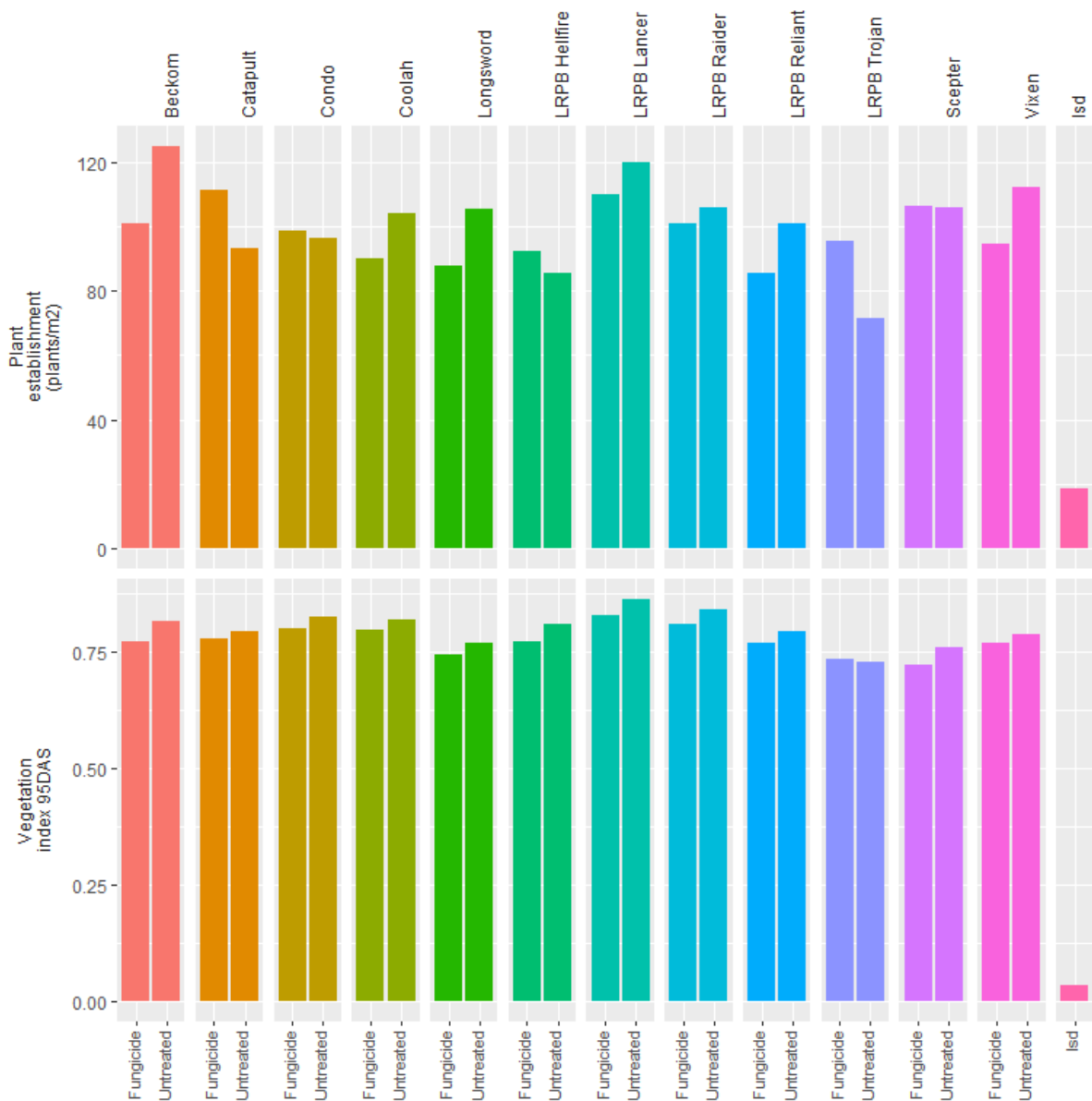
Results

Disease observations

- No diseases were observed

Vegetation index

There were no varietal differences in vegetation index (VI) assessed 95 days after sowing (DAS) between the sprayed and unsprayed treatments. There were differences in yield between varieties. Untreated LRPB Lancer[Ⓛ] had the highest VI at 0.86 while treated Scepter[Ⓛ] had the lowest yield at 0.72 (Figure 1).



GOA trial site report

Figure 1: Vegetation index assessed 71 and 85 DAS (14 and 28 July).

Grain yield

There were no differences in yield between the sprayed and unsprayed treatment of each variety. There were differences in protein between varieties. Untreated Beckom[Ⓢ] had the highest yield at 3.0 t/ha while treated LRPB Lancer[Ⓢ] had the lowest yield at 2.4 t/ha (Figure 2).

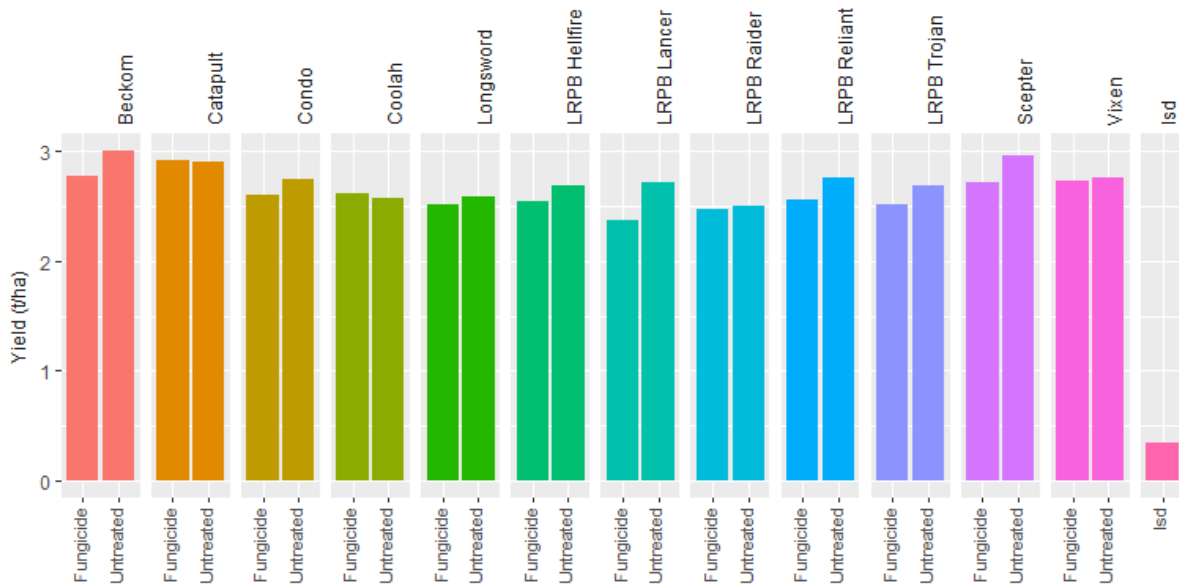


Figure 2: Yield and protein levels.

Grain quality

There were no differences in grain quality between the sprayed and unsprayed treatment of each variety. There were differences in yield between varieties. Treated LRPB Hellfire[Ⓢ] Beckom[Ⓢ] had the highest protein at 14.8% while treated Scepter[Ⓢ] had the lowest protein at 12.2% (Figure 3). Scepter[Ⓢ], Catapult[Ⓢ] and Coolah[Ⓢ] all had protein levels below 12.5% which would put them in a lower bin grade (H2 or AUH2), the remaining varieties would have all made H1 or APH2 on protein (except for LRPB Reliant[Ⓢ], for which the untreated tested below 12.5%).

Screenings were below 5% for all varieties, except for Vixen[Ⓢ] and Beckom[Ⓢ].

GOA trial site report

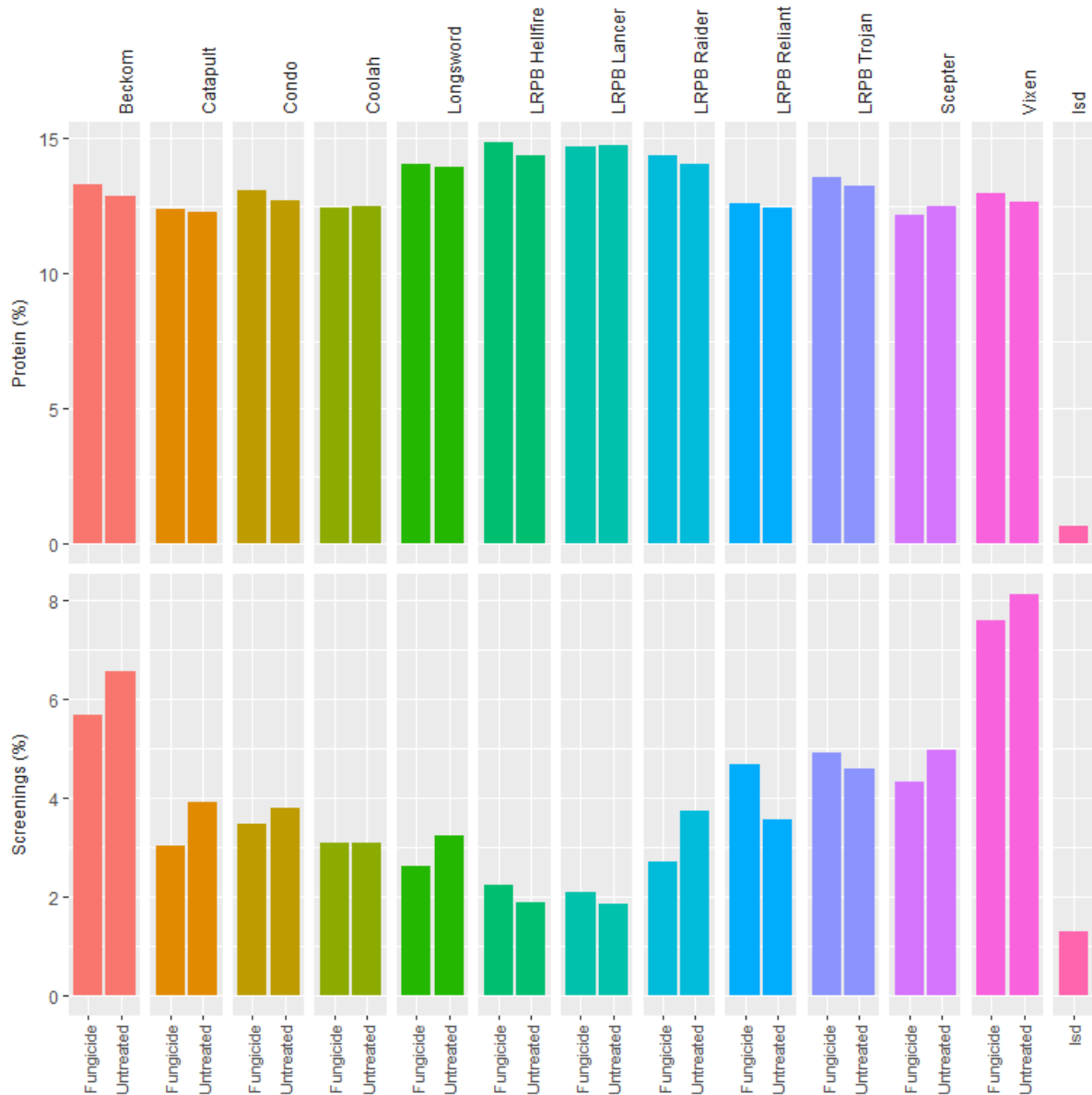


Figure 3: Protein and screenings.

Discussion

The 2023 was dry, resulting in no disease being detected. Fungicides were applied as determined by the trial protocol, however these proved not to provide any yield benefits and were most likely uneconomic.

Despite 2023 being a below average rainfall year, the site average yield was ~ 2.7 t/ha and the average protein was 13%. There was close to 0.6 t/ha yield difference between the highest and lowest yielding varieties, in part

GOA trial site report

reflecting NVT results i.e. Catapult^d outperforms LRPB Lancer, Beckom outperforms Condo^{d3}. Some of the varietal yield differences may be due to varieties being sown out of their recommended window, for example the early season variety Longsword^d sown on 15/5/23.

There was however no significant differences in VI, yields or grain quality for each treated and untreated variety.

2023 was a very dry season where the disease pressure was very low, and probably also demonstrates that the use of fungicides was not necessary under these circumstances.

Conclusions

- There was no yield response to fungicides across a range of varieties with differing levels of resistance in this trial, in a low disease pressure year.
- Yield differences occurred between varieties, consistent to those seen in NVT trials.
- The use of fungicides in dry, low disease pressure years may not be profitable.

Acknowledgements

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the Grains Research and Development Corporation (GRDC), the authors would like to thank them for their continued support. Special thanks go out to 45061 who hosted this trial.

DISCLAIMER — TECHNICAL

This report has been prepared in good faith on the basis of information available at the date of publication without any independent verification. The GRDC and GOA do not guarantee or warrant the accuracy, reliability, completeness or currency of the information in this publication nor its usefulness in achieving any purpose.

Readers are responsible for assessing the relevance and accuracy of the content of this publication. The GRDC and GOA will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

Products may be identified by proprietary or trade names to help readers identify types of products, but this is not, and is not intended to be, an endorsement or recommendation of any product or manufacturer referred to. Other products may perform as well or better than those specifically referred to.

³ NSW Winter crop variety sowing guide

GOA trial site report

Appendix

Results

Variety	Fungicide	Plant establishment (plants/m ²)	Vegetation index (95 DAS)	Yield (t/ha)	Screenings (%)	Protein					
Beckom	Fungicide	100.67	bcdefghi	0.77	ijklm	2.77	abfghi	13.30	ijklmno	5.69	cd
	Untreated	124.67	a	0.82	bcdegh	3.00	abcd	12.85	lmopqs	6.55	bc
Catapult	Fungicide	111.33	abce	0.78	hijklm	2.92	afghi	12.35	st	3.03	ijkl
	Untreated	93.33	efghi	0.79	efhijkl	2.90	abcdef	12.25	rt	3.92	efghi
Condo	Fungicide	98.67	cdefghi	0.80	cghilm	2.59	bcdejmn	13.05	knor	3.48	ghi
	Untreated	96.33	cdefghi	0.82	bcdg	2.73	fghjkl	12.67	mors	3.80	fghi
Coolah	Fungicide	90.00	fghij	0.80	ghijlm	2.60	bcdejmn	12.43	qst	3.10	ijkl
	Untreated	104.00	bcdefgh	0.82	bcdeg	2.57	hinpqrs	12.45	ors	3.08	hijk
Longsword	Fungicide	87.87	ghij	0.74	pqrs	2.50	delqt	14.05	dfhi	2.63	ijkl
	Untreated	105.33	bcdefg	0.77	lmnpq	2.58	ghiklm	13.90	ehjk	3.22	hijk
LRPB Hellfire	Fungicide	92.33	fghi	0.77	jkno	2.55	cdekop	14.83	ab	2.23	ijkl
	Untreated	85.67	ij	0.81	defghijk	2.69	ghiklm	14.37	abcdg	1.87	l
LRPB Lancer	Fungicide	109.67	abcde	0.83	abdef	2.36	ls	14.67	abce	2.08	kl
	Untreated	120.00	ab	0.86	a	2.71	ghiklm	14.72	acd	1.85	l
LRPB Raider	Fungicide	100.67	bcdefghi	0.81	bcdefg	2.46	elr	14.38	cdef	2.70	ijkl
	Untreated	105.67	bcdefg	0.84	abc	2.50	iorst	14.05	befgj	3.72	fghi
LRPB Reliant	Fungicide	85.33	hj	0.77	knop	2.56	cdekop	12.58	pqst	4.68	def
	Untreated	100.67	cdefghi	0.79	efhijkl	2.75	fgjkl	12.42	ors	3.55	fghij
LRPB Trojan	Fungicide	95.33	cdefghi	0.73	qrs	2.52	delqt	13.53	gjlm	4.93	def
	Untreated	71.67	j	0.73	st	2.68	ghiklm	13.25	ilnpq	4.59	defg
Scepter	Fungicide	106.33	abcdef	0.72	rt	2.71	bcjmno	12.18	st	4.33	efgh
	Untreated	105.67	bcdefg	0.76	mopqr	2.96	abcde	12.47	ors	4.97	de
Vixen	Fungicide	94.33	dfghi	0.77	knop	2.72	bcjmno	12.95	nopr	7.60	ab
	Untreated	112.33	abcd	0.79	fijklm	2.75	fgjkl	12.65	mors	8.13	a
Isd	Isd	18.44		0.03		0.35		0.67		1.29	